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Creativity, Innovation and Development of Novel Products in Cooperative Sector in Thailand

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Abstract

The cooperative (Co-op) sector is a primary producer of materials in the long chain of supplies from other private sectors, and it plays a key role as a central bone in an agricultural based country as Thailand. Therefore, the low price, high cost of post-harvesting, transportation and easy to damage raw materials provided by the Co-Op are big issues. To address this, the novel product development is alternatively channeled to enhance the competitiveness with high-end or premium products using creative thinking and premium quality raw material from organic farming system. From the results, the novel products namely "Aon-Wan", "Thayana Gold", "Nara Goat Milk" and "Palm Sweezz" are generated from Hom-Cholasit rice by Pakhai Co-Op, Organic farming banana powder by Thayang Co-Op, Goat milk powder by Goat Culture Naratiwat Co-Op and Palm sugar powder by Singha Nakhon Co-Op, respectively. The novel products with premium grade have already launched to the national and international markets.

Keywords: banana powder; Co-Op; milk powder; palm sugar; flooding tolerant rice

1. Introduction

Thailand is an agricultural country with high density of agro-industry products such as rice (31 million ton), sugarcane (68 million ton), cassava (21 million ton), maize (4.6 million ton), palm oil (8 million ton), and rubber (3 million ton). Also, fruit crops such as banana (0.24 million ton), durian (0.66 million ton) and mangosteen (0.27 million ton) have a big contribution [1]. Primary products of crops, fruit and vegetables from leading farmers are generally supplied to local markets, and partially exported to international markets (only premium grade). An example of export is the jasmine rice (cv. KDML105), which is the best in quality, has good aroma, has a good cooking quality, and soft. In 2010, 10 million tons of this rice variety has been exported to world

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markets. However, climate changes and global warming worsen the flooding situations in Thailand leading to crop loss, especially rice crop. Resolving flooding problem is a challenge for rice farmers [2-4].

Co-Op is one of the most utilized sectors in many countries including Japan, Korea, Thailand and China to increase profits not only in the novel product development, but also in the reduction of cost of farm management, facilities and heavy machines, and best agricultural practices as seed stock, fertilizer, pesticide/fungicide/herbicide and other chemical agents [5-6]. In Thailand, there are seven sectors of cooperative types. These are the 1) Agricultural Cooperative, 2) Land Settlement Cooperative, 3) Fisheries Cooperative, 4) Consumer Cooperative, 5) Thrift and Credit Cooperative, 6) Service Cooperative, and 7) Credit Union Cooperative with 9.68 million individual members (14% of the total population in country). Only the Agricultural Cooperative has a member of 5.95 million in year 2006 [7]. The first cooperative is initiated in the year 1916 namely the "Wat Chan Cooperative" in Phisanulok Province. Currently, a leading farmer not only needs to sell their products as soon as possible, but also he/she has to make sure that the return is high profit. Also, innovative products need to have international standard recognition following Good Agricultural Practices (GAP) and Good Manufacture Practices (GMP), and passing the requirements of ISO 9000 Water foot printing, CO2 emission and HACCP. These standardization are pyramided to support the premium, health care and high-end markets. For example, the successful case of the export Hom Thong organic banana by Thayang Cooperative in Petchaburi Province is known to have a well-established and strong networking with TOTO consumer cooperative in Japan. However, the value-added products are still in need to work closely with research and development not only in the government based institutes or universities, but also in the private sectors. The objective of this investigation is to create the role model of novel products in Co-Op sectors using creative initiation, business planning, novel product development, package designing and market networking.

2. Methodology

2.1 Focus group meeting

Cooperative manager and top leader were registered to initiate creative thinking by small group including agricultural base, fisheries base, financial properties and consumer products retail shops. Cooperative sectors (Co-Op) in Thailand are divided into 7 groups depending on the nature of the business. At the beginning, the focus group meeting was invited to set the strategic policy adoption with then Prime minister, Abhisit Vejjajiva and Deputy Commerce Minister, Alongkorn Ponlaboot.

2.2 Interview, intensive training, score ranking and implementation

The potential candidate Co-Op members were invited to pyramiding based on their creative products and servicing. The Co-Op members were selected as first round candidate base on score clustering, and then intensive training by expert trainers in the block course of business model, planning and feasibility study. Those business plans with novel products were presented and scored by 10 stakeholder committees in various fields with two major criteria, general score and creative score. The top ranking candidates were selected a model Co-Op business to promote novel products. The candidates were audited via site visiting to establish a strategic policy including agreement of manager, funding source, human resources and implementation process. Also, the overall selection criteria were demonstrated in Table 1. Then, the candidate Co-Op sectors implemented the whole processes prior to having the novel products with trade marks, branding, labeling, packaging, and marketing.

Table 1 Selection criteria for novel products and Co-Op business strategies.

Major criteria	Score				
	1	2	3	4	5
1. Leadership and clustering 1.1 Leadership and clustering 1.2 Friendly environments and corporate social responsibility					
2. Strategic policy 2.1 Development of strategic policy for competitive efficiency 2.2 Implementation of strategic policy					
3. Customer and marketing 3.1 Customer servicing and countermeasure for complaint 3.2 Customer relationship and satisfaction					
4. Information system and analysis 4.1 Data collection, evaluation and analysis 4.2 Implementation of information system management					
5. Human resource 5.1 Well organization and professional skill 5.2 Education, training and development concerning quality 5.3 Happiness, motivation and award system 5.4 Unique and innovative strategy concerning utilization of human resource as organization culture					
6. Business management and supply chain 6.1 Develop and design of novel product process and servicing 6.2 Measurement, standardization and utilize information system 6.3 Innovative approach to quality assurance of product and servicing					
7. Logistic management 7.1 Unique logistic process and management					
8. Safety, health/sanitation and environment 8.1 Management of health/sanitation and environment 8.2 Safety risk assessment and fire warning system					
9. Business results 9.1 Customer satisfaction results 9.2 Cash flow and marketing results 9.3 Human resource and management results 9.4 Competitive efficiency results					

3. Results and Discussion

In the Central area, 13 members of Co-Op were trained by expert trainers in various fields relating to business model, planning and feasibility. Only two candidates, Pakhai Co-Op (130 score) and Thayang Co-Op (126.4 score) garnered high score values. General and creative scores were chosen to create the whole chain of product development (Table 2). The site visiting and re-evaluation were done and scored (Fig. 1A). For example, the novel rice cultivar namely “Hom Cholasit” derived from conventional cross breeding of KDML105 (best quality of Thai rice) and IR57514 (Flooding tolerant cultivar of IRRI). The resulting cross breed is tolerant to water submersion for 14-21 days and insensitive to short-day photoperiod for thrice interval cultivation per annum with 5.6-6.0 ton ha^{-1} yield. A novel rice cultivar is identified as having a high cooking quality closely similar KDML105 including its low amylose content, rich aroma and soft texture. Seed stock and production technologies were transferred to the leading farmers via a Co-operative that functions as a pioneer in the private sector - the “Phakhai Co-Op”. The first initiation step of novel rice business was successfully developed in terms of seed stocking, good quality control and implementation, farm contracting system, cultural practices, and business management. In addition, the rice grain, packaging development and branding were investigated. A branding “Aon-Wan” derived from Phakhai Co-Op was already submitted to Department of Intellectual Property, Ministry of Commerce. The scientific information including flooding tolerance, ancient wetland and low amylose content with health oreinted branding, “Aon-Wan”, was made available for the public (Fig. 2). Recently, the final

product, a hundred percent rice grain branding "Aon-Wan", was launched to the customer through Co-Op function, wholesale and retail businesses both in the national and international rice market. A final solution gained from branding "Aon-Wan" was not only for food security, but also for cash income to sustainable life style of the farmers at risk in the wetland region. Flooding tolerant trait in rice crops have been developed by rice scientist, especially flood tolerance. For example, the novel rice variety of IRRI with 14 days water submersion tolerance has been discovered [8-10]. The Hom Cholasit rice variety was found by research scientist to have a water submission tolerance of 14 to 21 days. The history of rice breeding pedigree, selection procedure and cooking quality (especially low amylose content in the seed grain) were created as Aon-Wan branding (a meaning of low sugar derivatives), which was healthy for consumption.

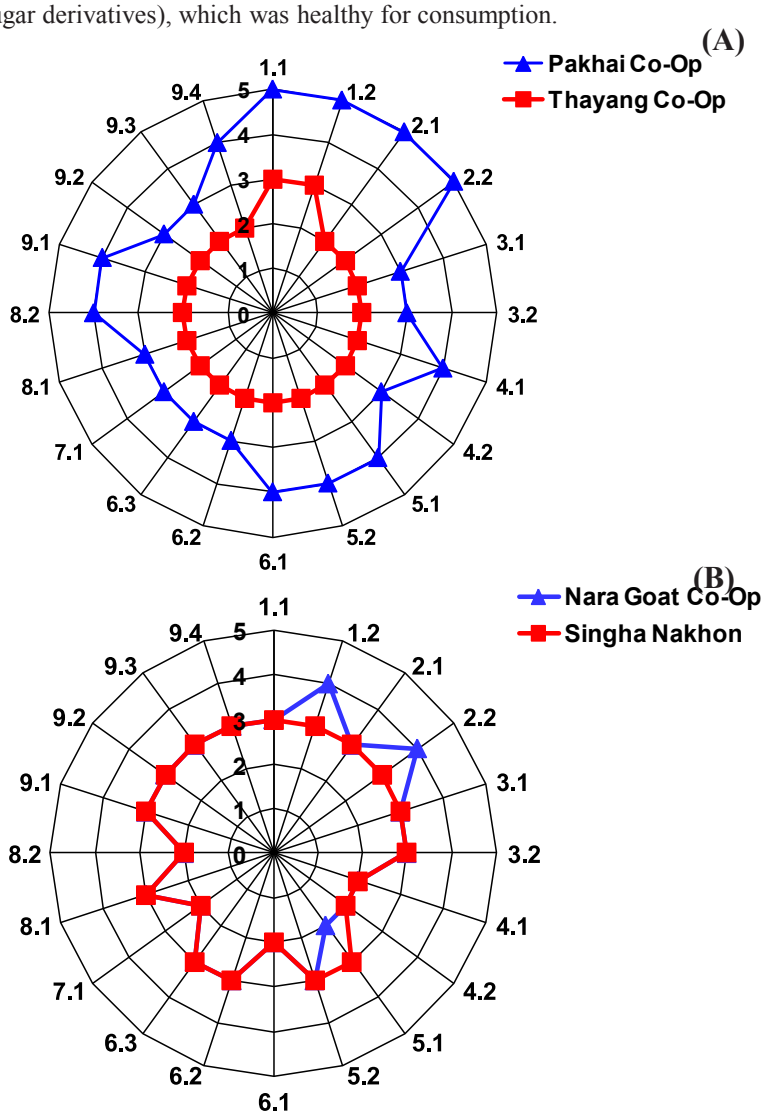

Fig. 1 Scoring levels of 9 criteria in the role model of cooperative sectors in Central (A) and South (B) regions of Thailand.

Table 2 Business planning of candidate Co-Op sector in Central region of Thailand.

Name	Province	Innovative Products	General score	Creative score	Total score	Ranking
1. Thayang Co-Op	Petchaburi	Banana powder	76.4	50	126.4	2
2. Thamai Co-Op	Chantaburi	Exported fruit	75.1	25	100.1	13
3. Nakhonprathom Milk Co-Op	Nakhonprathom	Pasteurization milk with coconut flavour	74.1	50	125.1	4
4. Wat Singha Co-Op	Chainat	Oil petroleum service	73.9	25	99.1	12
5. Kasetsart University Co-Op Shop	Bangkok	Modern shop improvement	78.7	25	103.9	7
6. Navy Co-Op	Lopburi	Inventory improvement	77.8	25	103.6	8
7. Bangkok Co-Op Shop	Bangkok	Increase income	78.6	25	102.5	11
8. Singburi Co-Op Shop	Singburi	Distribution center	78.9	40	118.7	6
9. Burapa Co-Op Shop	Chonburi	Opened new branching	77.5	25	102.8	10
10. Cop Sector Co-Op	Bangkok	Increased accountancy	70.3	25	103.3	9
11. Makhong Fisheries Co-Op	Samutsomgkham	Dried fish products	78.3	40	125.8	3
12. Pakhai Co-Op	Ayuthaya	Chonlasit flooding resistant rice	80.0	50	130	1
13. Banpuan Co-Op	Samutsakhon	Coconut jelly	73.3	50	123.3	5

Fig. 2 Samples of novel products, “Aon-Wan”, “Thayana Gold”, “Naragoat milk” and “Palm Sweezz” derived from Cooperative sectors.

Production of organic fresh bananas is a routine job of Thayang Co-Op in cooperation with Japanese private buyers as importers. The brand Thayana Gold was already granted by Department of Intellectual Property, Ministry of Commerce. The novel products "banana powder" using freeze drying technology was created to keep the flavour, aroma and texture as 100% natural (Fig. 2). The banana powder products were added to cow milk resulting to a delicious banana-flavoured milk, which is well known in Japan and Korea. In addition, banana powder is also used as a new flavour of a rice cracker, a new product created in cooperation with Samsung Food Machine Co. Ltd. (Korea). Freeze drying is a novel technology used in agricultural products especially for fruit preservation (post harvest processing) to lengthen shelf life and preserve natural favours [11-14]. For example, tropical fruits such as banana [15], durian [16], acerola [17] and marolo [18] from tropical regions have been transformed into powders via freeze drying technology. Also, Hom Thong banana, a unique fruit in Thailand produced by organic farming system, can be transformed into premium grade powder for further product development.

In the Southern region, 14 members of Co-Op were trained by expert trainers in various fields relating to business models, planning and feasibility. Only two candidates, Goat Culture Naratiwat Co-Op (134.2 score) and Singha Nakhon Co-Op (129.8 score), garnered high score values. General and creative scores were chosen to create the whole chain of product development (Table 3). The site visiting and re-evaluation were done and scored (Fig. 1A). In Songkhla province, palm trees are very are very important for local communities and their cultivations could be traced wayback hundred of years ago. Locals are still doing things their ancestors did as seen in their climbing styles, inflorescence cuttings, evaporation styles, and multipurpose usages of palm in the communities. A large number of palm trees in these areas has been identified similar to those in Petchaburi area, which is well-known for its palm sugar production in Thailand. However, the local products have been found to have low price and unattractive. Also, high competition, low chance of market sharing and short life shelf have been observed. From those problems, the innovative product namely "Palm Sweezz", which is derived from palm sugar, has been developed by Singha Nakhon Co-Op as a novel and value-added product (Fig. 2). Palm Sweezz in the premium quality and innovative packaging has not only served as sweetener, but also has other benefits as it is 100% natural; free from chemical agents, environmentally friendly and promotes health. Palm Sweezz product is developed by Singha Nakhon Co-Op Ltd. It has been guaranteed to have premium quality, standardized processing, and no chemical contaminants (100% natural product). Generally, palm sugar production by palm growers was done based on opened evaporation with the browning colour and loss of the volatile compound. They are seeking for the novel evaporation technology including closed evaporation, cyclone spray as well as freeze drying [19-21]. A novel compound in the palm sugar is not only the sap sugar but also containing the antioxidant agents [22]. Also, the keeping of antioxidant and volatile compounds in the palm sugar is the final target of novel technology in sugar processing.

Goat milk was well known for having special properties that were rich in nutrition and nutraceutical food in the ancient period (>1,000 years in Egyptian era). In recent years, chemical properties in goat milk have been discovered by research scientists. The short chain of fatty acid in goat milk is digested and directly absorbed by digestive system of human to prevent malabsorption syndrome. Antiproliferative factor (APF-AH) is an alternative major component in goat milk to function as coronary embolism and atherosclerosis (low LDL) leading to reduce risk of hypertension and heart disease. Casein type α-S1 in goat milk is very low when compared to cow milk, causing to lessen allergenic symptoms. Moreover, there are many vitamins i.e. vitamin A, E, B2, B3 and choline, which are major components in the goat milk to enhance the white blood cells and immune regulation. Enriched calcium (Ca) and phosphorus (P) elements in the goat milk are well established as a major component of human bone, especially in the young generation. Finally, a risk of cancer cells can be prevented by glutathione antioxidant compound (detoxification system), which is a dominant in goat milk. "Nara Goat Milk", a new brand of goat milk powder, is a novel product of Goat Culture Naratiwat Co-Op enriched with Calcium and Phosphorus. The whole process of goat milking and powdering is done 100% natural (Fig. 2). Nutrient contents in a 225 mL goat powder is composed of 8.18 g protein, 7.8 g fat, 10.42 g carbohydrate, 10.2 g

sugar, 343 IU vitamin A, 100 IU vitamin D and 80 μg folic acid, which are richer than cow milk [23-24]. In addition, important minerals are also present in fresh goat milk i.e. 1,260 mg kg-1 Ca, 970 mg kg-1 P, 1,900 mg kg-1 potassium, 550 mg kg-1 iron, 300 mg kg-1 copper, 80 mg kg-1 manganese and 80 mg kg-1 iodine [25]. Also, goat milk has been added to several products including fluid milk, evaporated and dried milk, cheeses, fermented milk, desserts, sweets, butter-like products, whey products and cosmetics [26].

Table 3 Business planning of candidate Co-Op sector in South region of Thailand.

Name	Province	Innovative Products	General score	Creative score	Total score	Ranking
1. Patani Fisheries Co-Op	Patani	Novel fishery products	76.4	40	116.4	6
2. Singhanakhon Co-Op	Songha	Palm sugar powder	79.8	50	129.8	2
3. Ranong Co-Op	Ranong	4 in 1 coffee products	82.2	40	122.2	3
4. Changku Rubber Tree Co-Op	Suratthani	Smoked rubber	75.8	25	100.8	14
5. Kuankaluang Co-Op	Satul	Oil palm products	82.6	30	112.6	7
6. Khaonoi Co-Op	Nakhonsrithamarat	Rubber products	81.0	25	106.0	11
7. Tephanom Transportation Co-Op	Suratthani	Map Road traveling Laos	76.4	25	101.4	13
8. Chamuang Co-Op	Pathaluang	Fermented fish products	91.4	30	121.4	4
9. Thang Co-Op	Thang	Rubber compound	83.8	25	108.8	9
10. Yantakhao	Thang	Modern shop	87.0	30	117	5
11. Goat Culture Narathiwat Co-Op	Narathiwat	Goat milk powder	94.2	40	134.2	1
12. Pathaluang Co-Op Shop	Pathaluang	Opened new branch	79.6	25	104.6	12
13. Kokpoa Co-Op	Patani	Novel product from lemon	82.1	30	112.1	8
14. Nakhonsrithamarat Co-Op Shop	Nakhonsrithamarat	Improvement the shop	82.3	25	107.3	10

In summary, four model Co-Ops namely Pakhai, Thayang, Singha Nakhon and Goat Culture Naratiwat were successful in branding, packaging and making novel products relating to their expertise in raw material production (Fig. 3). We hope that the basic knowledge, creative idea and implementation from this investigation will be rapidly launched in the Co-Ops to enhance the competitiveness of Thailand in the world markets.

4. Copyright

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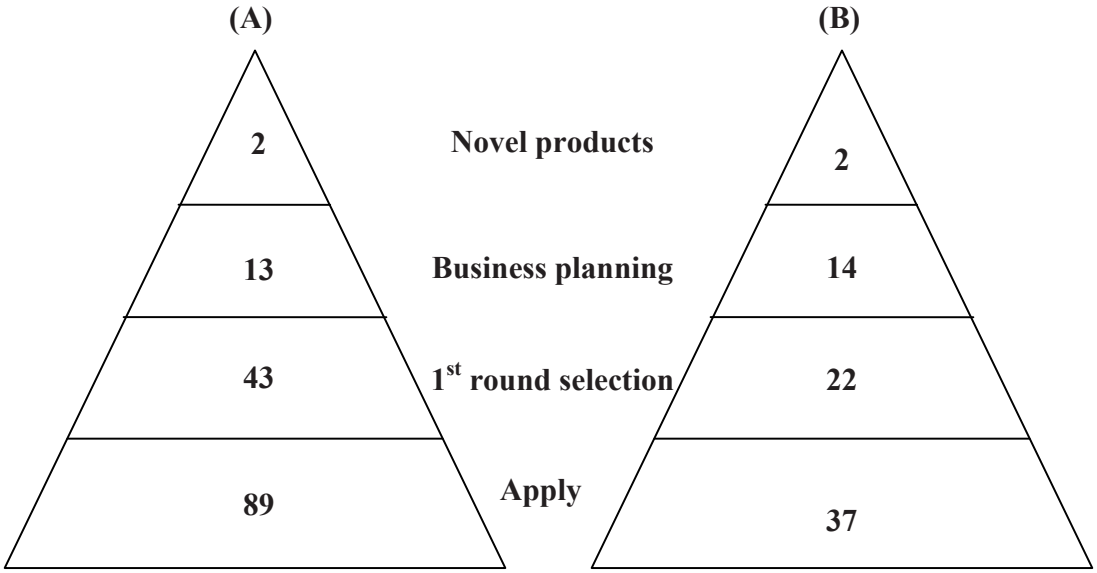

Fig. 3 Pyramiding summary of novel products in Central (A) and South (B) regions from Cooperative candidates.

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